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5. HATCHERIES' IMPACTS TO SUMMER CHUM SALMON

5.1. Introduction

Artificial production (hatcheries) techniques may be used to supplement depressed wild summer chum populations or to reintroduce summer chum back into streams where the original population no longer exists. The co-managers (Washington Department of Fish & Wildlife and the Point No Point Treaty Tribes) initiated supplementation programs for natural Hood Canal summer chum salmon populations during the 1992 brood year²⁵. They did this, for example, in the Quilcene River using Quilcene summer chum stock. More recently, the co-managers have designed and implemented supplementation programs to reintroduce populations into streams where they had been extirpated.

Artificial Production Definitions (from WDFW and PNPTT 2000)

Supplementation: “The use of artificial propagation to maintain or increase natural production while maintaining the long term fitness of the target population, and keeping the ecological and genetic impacts to nontarget populations within specified biological limits.”

Reintroduction: “The transfer and release of progeny from an appropriate broodstock into a watershed where the target species or race has been extirpated, for the purpose of reintroducing the species or race and creating a self-sustaining return.”

Enhancement: “The use of artificial propagation to produce fish that are primarily intended to be caught in fisheries.”

WDFW and PNPTT (2000) believe that artificial production and hatchery management, for summer chum salmon, should be directed at **only** those populations identified as **at risk of extinction**. They further believe that they should be directed at selected extirpated populations within the ESU geographic area. The goal of the co-managers for supplementation is (from WDFW and PNPTT 2000) to, “Restore naturally-producing, self-sustaining populations to their historic localities and levels of production, and minimize the risk of further declines, while conserving the genetic and ecological characteristics of the supplemented and reintroduced populations, and avoiding genetic and ecological impacts to other populations.” An overarching premise assumed in implementing these conservation hatchery programs in the region is that summer chum salmon populations threatened with extinction cannot be recovered to viable population levels with harvest and hatchery measures alone. Commensurate, timely improvements in the condition of habitat critical for summer chum salmon survival are necessary to recover the listed populations to healthy levels.

²⁵ “Brood year” is the year adults return to their natal streams to spawn.

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The intent of the supplementation efforts is to reduce the short-term extinction risk to existing wild populations, and to increase the likelihood of their recovery. This current emphasis is in response to the generally poor condition of the stocks of summer chum. In the future, as the stocks recover, consideration may also be given to enhancement of summer chum for fisheries benefit. However, specific conditions, criteria, and guidelines will need to be defined before artificial production would be pursued for that purpose. The current supplementation program, being implemented by the co-managers, addresses artificial production only as it applies to population recovery and reintroduction (WDFW and PNPTT 2000).

This section summarizes the co-managers' work on hatchery management and supplementation of summer chum salmon. It will be drawn primarily from the *Summer Chum Conservation Initiative* (SCSCI – WDFW and PNPTT 2000) and its supplemental reports (WDFW and PNPTT 2003). The National Marine Fisheries Service (NMFS) ESA section 7 biological opinion completed for Hood Canal summer chum salmon supplementation and other anadromous salmon hatchery programs in the region (NMFS 2002), and the Hatchery Scientific Review Group (HSRG) "Hatchery Reform Recommendations" addressing the summer chum hatchery programs (HSRG 2004) were also used as references. The listed reports describe the supplementation program for summer chum salmon in detail. They also describe the results from on-going monitoring and evaluation of the individual supplementation programs.

5.2. Summary of SCSCI Supplementation Programs

All summer chum salmon supplementation and reintroduction programs implemented in the region apply stringent operational criteria to reduce the risk of adverse impacts to target and non-target summer chum salmon populations. These conservation-directed measures are described in the individual Hatchery and Genetic Management Plans (HGMP) for the programs, and further detailed in the SCSCI (WDFW and PNPTT 2000). Overarching hatchery operational measures are included in the SCSCI to indicate when to supplement or reintroduce, when to modify or terminate a program, how to supplement or reintroduce. General and specific standards describing how supplementation and reintroduction programs will be conducted are applied to address risks to natural origin fish and to ensure the effectiveness of supplementation and reintroduction programs selected for implementation.

Key summer chum salmon hatchery conservation standards include: maintenance of unsupplemented natural populations that comprise a representative spectrum of existing diversity in the region; limitation of the duration of all hatchery programs to a maximum of three summer chum salmon generations (12 years) to minimize the likelihood for divergence between hatchery broodstocks and target natural stocks; propagation and release of only

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the indigenous populations into each watershed; collection of broodstock so that they represent an unbiased sample of the naturally spawning donor population with respect to run timing, size, age, sex ratio, and any other traits identified as important for long term fitness; limitation of hatchery rearing to a maximum of 75 days to minimize the level of intervention into the natural chum life cycle, reducing domestication selection effects; and, limitation of annual juvenile fish release levels based on achieving historical spawner abundances in each watershed. Monitoring and evaluation standards and methods are also implemented in each program to collect information that will help determine the degree of success of each project; if a project is unsuccessful, why it was unsuccessful; what measures can be implemented to adjust a program that is not meeting objectives set forth for the project; and, when to stop the supplementation project. Monitoring and evaluation activities specifically address four elements: the estimated contribution of supplementation/reintroduction program-origin chum to the natural population during the recovery process; changes in the genetic, phenotypic, or ecological characteristics of populations (target and non-target) affected by the supplementation or reintroduction program; the need and methods for improvement of hatchery activities in order to meet program objectives, or the need to discontinue a program because of failure to meet objectives; and determination of when supplementation has succeeded and is no longer necessary for recovery.

As of June 2005, summer chum salmon supplementation programs continue at Lilliwaup Creek, Hama Hama River, and Jimmycomelately Creek. Summer chum salmon have been successfully re-introduced in two streams that were previously occupied by summer chum, Big Beef Creek and Chimacum Creek. A third reintroduction program is underway on the Tahuya River. Supplementation or reintroduction programs have been terminated on several streams, because they have met the individual projects' production level goals specified in the SCSCI (WDFW and PNPTT 2000). Projects that have been terminated include Big Quilcene River, Salmon Creek, Chimacum Creek, and the Union River. The last releases of fish from these programs occurred in 2004 (Brood Year 2003).

Following are summaries of the individual supplementation and reintroduction projects for Hood Canal/Eastern Strait of Juan de Fuca summer chum salmon (modified from WDFW and PNPTT 2000, WDFW and PNPTT 2003, and Adicks, et. al. 2005):

LILLIWAUP CREEK

A supplementation program began on Lilliwaup Creek in 1992 as a cooperative project between Hood Canal Salmon Enhancement Group (HCSEG) and WDFW. In 1994, Long Live the Kings (LLTK) assumed the role of the primary project operator. Through 1997, there were difficulties in collecting adequate numbers of broodstock from Lilliwaup Creek. Attempts in this regard were complicated by the lack of a fish collection trap, low overall summer chum return

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levels, and the presence (in odd-numbered years) of pink salmon in the same stream areas as summer chum. Beginning in 1998, WDFW was able to provide limited funding for this project, allowing for the installation of a trap in the lower creek, increased agency assistance during fish spawning, and increased monitoring and evaluation of the supplementation program.

Until 2001 and 2002, adult return levels had not improved since the program began. Program operational improvements begun in 1998 have apparently contributed to increased adult returns, with observed spawning escapements of 859 fish in 2002, 353 fish in 2003, and 1,017 fish in 2004 (WDFW and PNPTT 2005 data). The Co-managers will continue to monitor the adult returns. According to the standards set in the SCSCI and Hatchery and Genetic Management Plans (HGMP), the expected duration of the program is a maximum of 12 years (3 generations). The original program began in 1992, however, due to the lack of adequate broodstock collection until 1998, and only recent indications of population recovery, the Co-managers have established 1998 as the effective start-up year for the program. The 12 year maximum program duration criteria will therefore be based on 1998 as the program start-up date. The Lilliwaup supplementation project has generally addressed the program objectives described in section 3.2.3.4 of the SCSCI.

HAMA HAMA RIVER

The Hama Hama multi-species salmonid recovery project was developed by HCSEG with support from others. Out of this effort evolved the Hama Hama summer chum supplementation project on John Creek, a Hama Hama River tributary. A review of freshwater habitat conditions, summer chum escapements, potential causes for decline in escapement, and current restoration efforts in Hood Canal by the Co-managers and cooperators, led to the recommendation to initiate the summer chum supplementation project, beginning with brood year 1997.

It appears that the Hama Hama River summer chum supplementation program was generally successful in collecting a representative sample of broodstock from the natural Hama Hama River summer chum population. Consistent with the standards set in the SCSCI and HGMP, the expected duration of the program is a maximum of 12 years (3 generations) beginning with brood year 1997. It is too early in the program to assess the success of adult returns. Over 1,000 adults produced in the program returned to the Hama Hama River during 2002, but the number of program returns dropped to approximately 300 in 2003 and 2004 (WDFW and PNPTT 2005 data). The Co-managers are continuing to monitor the returns. The Hama Hama supplementation project has addressed the program objectives described in section 3.2.3.4 of the SCSCI.

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JIMMYCOMELATELY CREEK

The Jimmycomelately (JCL) Creek supplementation project was completed with the 1999 brood year and is a cooperative effort between WDFW, North Olympic Salmon Coalition, and Wild Olympic Salmon. The SCSCI has noted that habitat impacts are high and may be contributing to the risk, and recommended that habitat protection and recovery measures should be addressed concurrent with supplementation project development. Habitat restoration projects have been prioritized, funded, and initiated in freshwater and estuarine areas of JCL Creek. In particular, restoration and improvement of lower creek and upper estuarine habitat in the watershed now provides improved access to spawning areas, and improved spawning and incubation conditions, for adult summer chum salmon returning as a result of the supplementation program. The integration of these habitat restoration actions with the supplementation program is designed to improve prospects for supporting a self-sustaining, viable natural summer chum salmon population in the watershed after the supplementation program terminates.

It appears that the JCL Creek summer chum supplementation program has been generally successful in collecting a representative sample of broodstock from the natural JCL Creek summer chum population, and increasing adult return levels above the post population decline (1988-91) average escapement of 88 fish. Supplementation program-origin fish comprised 85% of the total adult return of 446 fish in 2003, and 63% of the total adult return of 1,662 fish in 2004 (WDFW and PNPTT 2005 data). Consistent with the standards set in the SCSCI and HGMP, the expected duration of the program is a maximum of 12 years (3 generations) beginning with brood year 1999. The Co-managers will monitor the adult returns from fry released from the supplementation program. The Jimmycomelately Creek supplementation project has addressed the program objectives described in section 3.2.3.4 of the SCSCI.

BIG QUILCENE RIVER

A supplementation program on the Big Quilcene River was started in 1992, in response to the critical condition of the Quilcene stock, and to take advantage of a year expected to be relatively strong in the Hood Canal summer chum return cycle. The program is operated by the US Fish and Wildlife Service (USFWS) at the Quilcene National Fish Hatchery (QNFH). It is apparent that the Big Quilcene supplementation project has contributed to increased returns observed for this stock. The Quilcene program contributed eggs and fry to support the re-introduction program for summer chum at Big Beef Creek from 1996 through 2000.

High levels of adult returns appear to be associated with the supplementation program. In fact, escapement of the Big/Little Quilcene stock has exceeded the

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escapement criterion for program reduction. The criterion is that the annual total of hatchery-origin and natural-origin escapement exceeds the mean 1974-1978 escapement for four consecutive years (see section 3.2.2.b of the SCSCI). The Big/Little Quilcene mean escapement for 1974 through 1978 is 2,607 spawners. Annual escapement exceeded that level every year, beginning in 1995, the first year of adult returns from the supplementation project. The Co-managers agreed to reduce the program production target to 300,000 fed fry for brood year 2002 and then to 250,000 fed fry for brood year 2003. Consistent with the standards set in the SCSCI and HGMP, the intended maximum duration of the program was 12 years (3 generations) beginning with brood year 1992. Accordingly, the program has been terminated and the last brood year of the Big Quilcene River program was 2003 (released in 2004, with last returns of supplementation program expected in 2006-08 as three, four and five year old adults).

BIG BEEF CREEK

The Big Beef Creek project began with brood year 1996 when eggs of Quilcene stock were transferred from Quilcene National Fish Hatchery (QNFH) to Big Beef Creek to initiate and support the reintroduction of a summer chum population there.

The Big Beef Creek summer chum reintroduction program has generally been successful in collecting a representative sample of brood stock from the Quilcene River summer chum population (1996-2000) and from Big Beef Creek returns (2001-2002). It is still early to judge the success of adult returns, but the numbers of summer chum adults that returned during 2001-2004 was encouraging, with from 730 to 1,742 fish escaping to spawn. The Co-managers will continue to monitor the adult returns. Consistent with the standards set in the SCSCI and HGMP, the expected duration of the program is a maximum of 12 years (3 generations) beginning with brood year 1996 (scheduled to end in 2008). The Big Beef reintroduction project has addressed the program objectives described in section 3.2.3.4 of the SCSCI during 1999 and 2000 (WDFW and PNPTT 2001) and again during 2001 and 2002. However, no study has been implemented to identify and compare wild and hatchery origin chum spawner productivity, and survival from out-migration to adult return. In compliance with planned research objectives for the program, NMFS, in cooperation with the co-managers, has initiated a study comparing the productivity of hatchery and natural-origin summer chum spawners using the Big Beef Creek spawning channel. This study includes a comparison of relative survival of the progeny of hatchery and natural-origin summer chum salmon to adult return to Big Beef Creek.

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SALMON CREEK

The supplementation program, begun on Salmon Creek in 1992, was originally conceived with the objectives to rebuild and stabilize the Salmon Creek population, and to allow for the transfer of surplus eggs or fry to reintroduce summer chum to Chimacum Creek. The program reached its 12 year operational limit in 2003, and was terminated after summer chum fry releases from that brood year in Spring, 2004. When the program was initially implemented by Wild Olympic Salmon and WDFW, it was recognized that concurrent restoration of degraded natural habitat was required to accommodate enhanced adult returns, and to meet the goal of rebuilding a viable natural summer chum salmon population in the watershed that would remain self-sustaining after the supplementation program was terminated. An expansive habitat restoration project in the lower flood-plain re-established natural meander characteristics of the once-channelized lower creek in 2003, and natural and program-origin summer chum spawners used the restored area heavily for spawning in 2004. Redirection of a displaced upper tributary (Houck Creek) into its original channel in 2003 met the objective of substantially decreased sediment loads adversely affecting summer chum egg and fry survival in downstream spawning areas.

The Salmon Creek supplementation program has resulted in substantial increases in the total number of summer chum salmon adults returning to spawn in the watershed. The average escapement to the watershed has been increased from 283 fish for the four years prior to the commencement of the program (1989-92) to an annual average of 5,303 fish for the most recent four years (2001-2004). Natural-origin summer chum returns have also been increased, with escapements ranging from 1,570 to 2,025 fish, or an annual average of 65% of the total return over the last four years. Although it appears that impacts to natural processes in freshwater and/or estuarine habitats have likely limited natural summer chum production in the stream in some years, habitat restoration actions implemented in recent years are expected to improve survival and productivity conditions for natural fish. In addition to its substantial contribution to the summer chum adult return to Salmon Creek, the hatchery program also succeeded in providing seed stock for reintroduction of a summer chum return in Chimacum Creek. Adult returns to Chimacum Creek have been re-established to the point that transfers of Salmon Creek stock were no longer necessary beginning in 2004. The Salmon Creek supplementation project has addressed the program objectives described in section 3.2.3.4 of the SCSCI. Commensurate with the summer chum salmon reintroduction program, North Olympic Salmon Coalition, Wild Olympic Salmon, Jefferson County, and WDFW implemented habitat restoration projects designed to remedy major sediment input and lower channel degradation factors. These restoration actions were designed to improve prospects for the survival and productivity of naturally spawning summer chum salmon produced through the hatchery effort.

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CHIMACUM CREEK

Chimacum Creek supported an indigenous summer chum population until the mid-1980s, when a combination of habitat degradation and poaching evidently led to its demise (WDFW and PNPTT 2000). In 1992, Wild Olympic Salmon initiated a project to boost the number of summer chum in the Salmon Creek stock so it could be used as a donor stock to reintroduce summer chum into Chimacum Creek. Beginning with brood year 1996, eyed eggs from the Salmon Creek broodstock were transferred to, and released from, Chimacum Creek hatchery facilities, to reintroduce summer chum to formerly occupied habitat.

It appears that the Chimacum Creek summer chum reintroduction program has generally been successful in collecting a representative sample of broodstock from the natural Salmon Creek summer chum population. It also appears successful in contributing to the return of adult summer chum to Chimacum Creek. Brood year 2001 and 2002 fry were successfully reared in the freshwater and saltwater facilities and released during March, April and May. Since 2000, the program generally met the production targets for number, size, and date of fry released. There has been no significant mortality to unknown causes. And, fish health condition of fry prior to release has been good. Total adult returns to Chimacum Creek from 2001 to 2004 ranged from 558 to 1,139 fish, and averaged 866 fish. Of the total spawner escapement over this period, an annual average of 383 fish, or 44% of the total, were natural-origin summer chum salmon established through the reintroduction program as returns to the creek. Consistent with the standards set in the SCSCI and HGMP for the program, the expected duration of the program is a maximum of 12 years (3 generations) beginning with brood year 1996. Substantial adult return levels to the creek, and data showing that the reintroduction program had led to the production, return, and spawning of natural-origin adult fish that were the progeny of naturally spawning hatchery fish, drove the decision to terminate the reintroduction program in 2004, well in advance of the 12 year duration limit. The Co-managers will continue to monitor annual adult returns to Chimacum Creek, including natural and hatchery-origin fish contribution levels. The Chimacum Creek reintroduction project has addressed the program objectives described in section 3.2.3.4 of the SCSCI.

UNION RIVER

The Union River supplementation program is a cooperative effort between the HCSEG and WDFW and was initiated in brood year 2000. The goal is to reintroduce and restore a healthy, natural, self-sustaining population of summer chum in the Tahuya River. The strategy is to boost the abundance of the Union River population to allow for transfers of surplus fish for a reintroduction of summer chum on the Tahuya River using Union River stock. The

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supplementation program, its goal, objectives, and guidelines are consistent with the SCSCI. Based on an increased abundance of adult returns in recent years (2001-2004 average of 5,064 adults) relative to post population decline years (1988-91 average of 391 adults), and indications that the supplementation program had successfully bolstered total return levels (2003-04 average return of 3,183 hatchery adults), the decision was made to terminate supplementation program fry releases into the Union River beginning in 2004.

It appears that the Union River summer chum supplementation program was generally successful in collecting a representative sample of broodstock from the natural Union River summer chum population. The Union River supplementation project has addressed the program objectives described in section 3.2.3.4 of the SCSCI. The phase of the project to reintroduce summer chum into the Tahuya River began with brood year 2003 (releases to the Tahuya River started in 2004).

TAHUYA RIVER

Reintroduction of summer chum from the Union River into the Tahuya River began with brood year 2003 (releases to the Tahuya River started in 2004). Following is a summary of the Tahuya situation from WDFW and PNPTT (2000).

The current level of observed escapements in the Tahuya River are not indicative of the existence of a self-sustaining summer chum population. Production historically depended on wild spawners only, and no hatchery programs using summer chum were implemented in the watershed. The following are objectives for using supplementation to reintroduce summer chum to the Tahuya River in future years (beginning in 2004):

Objective 1: Transfer southern Hood Canal-origin (Union River) eyed eggs from an appropriate stock for incubation, rearing and release of fry into the historical habitat of the Tahuya River population. Monitor adult returns resulting from the initial releases and assess the natural spawning success of these adults, where success is measured by return of the naturally produced adult offspring.

Objective 2: Determine if a self-sustaining, viable population has been established through the reintroduction program. If return levels are below desired recovery levels after an indigenous population has been established, use it as broodstock to supplant transfers, fostering local adaptation. If a self-sustaining population is successfully established, the population will represent a range extension of the donor southern Hood Canal stock.

5.3. Summary of Hatchery and Genetic Management Plan Conclusions

WDFW and USFWS prepared HGMPs for each of the summer chum salmon supplementation and reintroduction programs in the eastern Strait of Juan de Fuca and Hood Canal areas (as per WDFW and PNPTT 2000). NMFS approved

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the HGMPs in 2002 (NMFS 2002). Supported by information provided in the SCSCI, each HGMP provides a thorough description of each hatchery operation, including the facilities used, methods employed to propagate and release fish, measures of performance, status of ESA-listed stocks that may be affected by the program, anticipated listed fish take levels, and descriptions of risk minimization measures applied to safeguard listed fish. Much of the information in the HGMPs was derived from the SCSCI. The HGMPs were approved in 2002 by NMFS under Limit 5 of the ESA 4(d) Rule for a 12-year period (WDFW and PNPTT 2003). HGMPs for the summer chum salmon can be found at http://www.nwr.noaa.gov/1hgmp/approved/HC_QandA.htm, <http://www.nwr.noaa.gov/1hgmp/HGMPAppr.htm>, and more information can be found in Federal Register (2001a). Additional information regarding the ESU standing of the hatchery summer chum salmon populations propagated through the HGMPs and their impacts to ESU viability can be found on the NMFS Northwest region website at: http://www.nwr.noaa.gov/1srd/Prop_Determines/Inv_Effects_Rpt/index.html and in the Federal Register at: <http://www.nwr.noaa.gov/reference/frn/2005/70FR37160.pdf>

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5.4. Summary of NMFS Biological Opinion Conclusions

Addressing the ESA section 4(d) limit 5, NMFS, in a biological opinion (Consultation Number F/NWR/1999/01863) dated March 4, 2002, concluded that operation of the artificial propagation programs as described in the co-managers SCSCI (WDFW and PNPTT 2000) is not likely to:

- (1) jeopardize the continued existence of threatened Hood Canal summer chum salmon or Puget Sound chinook salmon, or
- (2) result in the destruction or adverse modification of these species' designated critical habitat, or
- (3) adversely affect the designated essential fish habitat.

In arriving at these conclusions, NMFS considered the best available scientific and commercial information, as well as comments from the Northwest Fisheries Science Center - NMFS, and other Federal and non-Federal technical experts and resource managers in the Northwest Region (NMFS 2002).

5.5. Summary of Hatchery Scientific Review Group Conclusions

In 1999, in response to a request from Washington State's Congressional representatives, a group of leading scientists presented its recommendations to the US Congress in a report entitled *The Reform of Salmon and Steelhead Hatcheries in Puget Sound and Coastal Washington to Recover Natural Stocks While Providing Fisheries*. The report determined that the potential exists for hatcheries to provide benefits to the recovery of naturally spawning salmon. The report called for a comprehensive hatchery reform effort to conserve indigenous genetic resources; assist with the recovery of naturally spawning populations; provide for sustainable fisheries; conduct scientific research; and improve the quality and cost-effectiveness of hatchery programs. The effort was to be led by an independent panel of scientists called the Hatchery Scientific Review Group (HSRG). The role of independent science in the Hatchery Reform Project is to advise fishery managers, agency scientists, legislators, and the public about the benefits and risks of alternative actions that could be undertaken to meet goals for salmonid resources, including the consequences of inaction (HSRG 2004).

Recommendations and comments from the HSRG include:

- Continue the existing program consistent with the Summer Chum Salmon Conservation Initiative (SCSCI), including collecting and analyzing all data necessary to evaluate the program's success.
- The SCSCI is a well-designed, well-conducted program that appears to be achieving its goals. It is an example of a successful conservation program and partnership among state, tribal, private, and federal entities.

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- The program, which may serve as a prototype for similar efforts in the future, has met the HSRG's first key principle of beginning with a solid goal setting process. Ensuring complete monitoring and evaluation of this program will be crucial to meeting the second and third principles—scientific defensibility and informed decision-making.
- Like all integrated hatchery programs, success will depend on good habitat being available to both the hatchery, and natural-origin, components of the integrated population (see HSRG system-wide recommendation about productive habitat).

The co-managers responded (from HSRG 2004) by saying, "The co-managers appreciate the HSRG comments in support of the SCSCI and support the recommendations of the HSRG. The co-managers agree that collecting and analyzing data is necessary to evaluate the program; however, additional funding will be needed to fully implement the monitoring and evaluation work described in the SCSCI. For example, critical objectives of the SCSCI include the monitoring and evaluation of the effects of reintroduction and supplementation on the natural summer chum populations and of the effectiveness of the programs in recovering summer chum. Monitoring and evaluation of the supplementation and reintroduction programs is ongoing by the co-managers and cooperators. However, dedicated funding is not currently available for the analysis of all otolith and DNA samples collected from summer chum adults returning to streams in the Hood Canal ESU. Some funding has been provided by the Regional Fish Enhancement Groups (HCSEG and NOSC), the Port Gamble S'Klallam and Skokomish tribes (BIA Salmon Recovery funds), and by WDFW (ESA Salmon Recovery funds). However, these sources of funds are not totally secure and additional funding is needed."

5.6. Adaptive Management Expectations

WDFW and PNPTT (2000) anticipate that as supplementation programs progress, and additional data and information is gathered, adjustments to the approach might be necessary. In particular, it is necessary to determine when to terminate the supplementation program or, at the least, institute major modifications. To that end, the co-managers developed an adaptive management approach, which is described in detail in SCSCI section 3.2.2.2. The following standards are applied to determine when a supplementation program is to be terminated or modified:

- The maximum duration of regional supplementation programs will be based on criteria that minimize the likelihood that potentially deleterious genetic changes occur in the wild population.

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- If adult return targets are met before the three maximum generation limit is reached, then the program may be reconsidered, and may be reduced or terminated.
- Supplementation and reintroduction programs may be terminated if they are no longer believed to be necessary for timely recovery, for reasons other than the success of supplementation or reintroduction, including improvements in ocean survival or habitat condition.
- The supplementation program will be modified or terminated if appreciable genetic or ecological differences between hatchery and wild fish have emerged during the recovery program.
- The supplementation program will be modified or terminated if there is evidence that the program is impeding recovery.
- The supplementation and reintroduction programs will be modified or terminated if there is evidence that the program is negatively impacting a non-target ESA-listed population.

Monitoring and evaluating the effects of supplementation on the natural summer chum population, and the performance of the overall program in effecting the recovery of summer chum, are critical objectives of this SRP. The basic approach to monitoring and evaluation will be to collect information that will assist in determining: 1) the degree of success of each project; 2) if a project is unsuccessful, why it was unsuccessful; 3) what measures can be implemented to adjust a program that is not meeting objectives set forth for the project, and; 4) when to stop a supplementation project. SCSCI section 3.2.2.4 (WDFW and PNPTT 2000) describes the details of a monitoring program for the supplementation projects and is fully endorsed by this SRP.

5.7. Hatchery Program Integration with Harvest Management Actions

The Co-managers have been applying specific measures to protect natural and hatchery-origin Hood Canal summer chum salmon populations from significant fisheries harvest impacts since 1992. Following on this protective approach, beginning in 1999 and as described in the SCSCI, the Co-managers implemented a comprehensive harvest management regime, referred to as the Base Conservation Regime (BCR), designed to protect and rebuild summer chum salmon populations in the region. This approach is more fully described in Section 4 of the SCP. NMFS approved the BCR approach in 2003 under the ESA 4(d) Rule limit 6 (NMFS 2003b). Under the BCR, summer chum salmon may only be caught incidentally in salmon fisheries targeting other, more abundant and healthy populations. Most of these fisheries require the non-retention of summer chum salmon. This harvest management approach applies

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to all salmon fisheries which impact listed Hood Canal summer chum salmon, including Canadian salmon fisheries.

The BCR is implemented to protect natural and hatchery-origin summer chum salmon, ensuring that the vast majority of these fish escape to spawn naturally, or return to broodstock collections locations for use in supplementation and reintroduction programs. The harvest approach is fully integrated with the supplementation and reintroduction strategy implemented in the region, as it is designed to deliver nearly all summer chum salmon adults produced naturally and by hatcheries to their watershed of origin, fully complementing the population preservation and restoration intent of the hatchery programs.

5.8. Summary of Hatchery Programs Producing Other Salmon Species

The Co-managers have also implemented conservation measures in state, tribal and federal hatchery operations producing other salmon species within the ESU geographic area. These measures, fully described in the SCSCI, are designed to reduce the risk of harm to summer chum salmon survival and productivity associated with the “non-summer chum” hatchery operations and resultant fish releases (WDFW and PNPTT 2000). Operation of these other salmon hatchery programs in the region will lead to the average annual liberation of approximately 6.7 million fall chinook salmon juveniles, 0.4 million early run chinook salmon, 1.8 million coho; 0.5 million pink salmon; 25.0 million fall chum salmon; and 1,700 steelhead. The programs producing the fish apply broodstock capture, fish culture, and juvenile fish release measures based on best management practices that reduce the risk of injury and mortality, and the risk of adverse ecological and genetic effects, to summer chum salmon. Important juvenile fish release measures include: the delay in releases of hatchery yearling salmon smolts until after April 15 each year to limit the risk of predation to March-emigrating summer chum fry in freshwater and estuarine areas; and, reduction of the risk of food resource competition effects to emigrating summer chum juveniles in estuarine and marine areas through a delay in annual releases of all fall chum and pink salmon fry from hatcheries in the region until after April 1. Monitoring and evaluation programs are conducted to assess potential ecological interactions with summer chum salmon juveniles and adults. Broodstock collection operations are evaluated annually to determine effects on summer chum salmon resulting from the removal of hatchery salmon adults.